

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2022-98

Anonymous Referee #1

Referee comment on "The impact of aerosol fluorescence on long-term water vapor monitoring by Raman lidar and evaluation of a potential correction method" by Fernando Chouza et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-98-RC1>, 2022

The smoke layers in the low stratosphere, in contrast to dust or volcanic ash, can provide strong fluorescence. The smoke fluorescence, in particular, was analyzed, in recent publication:

Veselovskii, I., Hu, Q., Ansmann, A., Goloub, A., Podvin, T., Korenskiy, M.: Fluorescence lidar observations of wildfire smoke inside cirrus: A contribution to smoke-cirrus - interaction research, Atmos. Chem. Phys., 22, 5209–5221, 2022.

In the manuscript presented, the authors analyze the influence of smoke fluorescence on Raman water vapor measurements in stratosphere. They demonstrate that smoke contribution is significant and suggest the scheme to correct corresponding contamination. Comparison of lidar and zonde measurements convincingly demonstrate, that their approach allows significantly to decrease the uncertainty of vapor measurements inside the smoke layers. Manuscript is well and clearly written, and is suitable for publication in AMT. I have just several technical comments.

Fig.1. Green letters M-09 at the top of the figure probably mean MOHAVE-2009. This should be explained in the capture.

Influence of fluorescence on the vapor measurements discussed also in:

Reichardt, J.: Cloud and aerosol spectroscopy with Raman lidar, J. Atm. Ocean. Tech., 31, 1946-1963, 2014.

Fig.5c. From the title of left axis it is not clear, that this is the ratio of the channels

Fig.6c. I am a bit confused by the explanation of increase of uncertainty at high altitudes after correction. If we measure the sum of water vapor and fluorescence signal, does it mean that statistical uncertainty of vapor measurements becomes lower? I think uncertainty of vapor signal should stay the same...Correct me if I am wrong.

Ln.438. " but k is substantially more difficult to quantify and much more variable as it depends on the composition of the interfering aerosols"

Why does this coefficient depends on aerosol type? I think only absolute value of fluorescence signal depends, but not $k_{\delta} \square \square 1$.